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Protocols For Authorized Release Of Concrete

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Protocols for Authorized Release of Concrete

ABSTRACT

Much of the clean or slightly contaminated concrete from Decontamination and Decommissioning (D&D) activities could be re-used. Currently, there is no standardized approach, or protocol, for managing the disposition of such materials. Namely, all potential disposition options for concrete, including authorized release for re-use, are generally not fully evaluated in D&D projects, so large quantities have been unduly disposed of as low-level radioactive waste. As a result, costs of D&D have become prohibitively high, hindering expedient cleanup of surplus facilities. The ability to evaluate and implement the option of authorized release of concrete from demolition would result in significant cost savings, while maintaining protection of environmental health and safety, across the Department of Energy (DOE) complex.

The Idaho National Engineering and Environmental Laboratory (INEEL), Argonne National Laboratory East (ANL-E), and Vanderbilt University have teamed to develop a protocol for the authorized release of concrete, based on the existing DOE guidance of Order 5400.5, that applies across the DOE complex. The protocol will provide a streamlined method for assessing risks and costs, and reaching optimal disposal options, including re-use of the concrete within the DOE system.

NEED FOR CONCRETE RELEASE STANDARDS

Significant cost savings could be achieved if concrete from D&D projects is re-used, particularly in light of the fact that more than 95% of the concrete is essentially uncontaminated. Many DOE

facilities contain large volumes of concrete that must be removed during D&D activities. Much of this material is not contaminated, or is contaminated at very low levels. However, since release standards do not exist (note: the ANSI N13.12 Clearance Standards were recently published but have not been endorsed by the regulatory agencies) that define whether the concrete can be released for re-use, the concrete is usually disposed of as radioactively contaminated material – a rather expensive practice. Although the monetary value of concrete rubble and slab material for recycling is not high, the money saved by re-using the concrete on site can be significant. Re-using concrete as fill material or road base saves the expense of hauling it to a landfill or radioactive waste disposal site, disposal costs at a radioactive waste disposal site, and the expense of hauling in clean fill material. At the INEEL alone, the projected cost savings from re-using concrete materials from D&D projects rather than disposing of them at a radioactive waste disposal site are estimated to be $5.5 million.

Given the obvious benefits, it is important that the authorized release option be carefully evaluated so that the enormous cost savings can be realized while maintaining adequate levels of protection for environmental health and safety. To this end, this project will develop a streamlined protocol for implementing such a release option.

PROJECT ESTABLISHED TO DEVELOP PROTOCOL

A project has been established to develop the protocol necessary to re-use concrete within the DOE complex. The primary goal of this project is to develop and test a protocol for the authorized release of concrete that can be applied across the DOE complex. Funded by the National Energy Technology Laboratory, through the Accelerated Site Technology Deployment (ASTD) program,

this project is a team effort among ANL-E, Vanderbilt University, and the INEEL. Each of these partners brings background and experience that will contribute to the success of this project. In a previous effort, ANL-E developed an authorized process for the authorized release of scrap metal (as demonstrated in the P2Pro (Residual Scrap Metal) management tool) and has extensive capabilities in risk assessment. Vanderbilt University has extensively researched and reported on the characteristics of the concrete within DOE facilities. The INEEL provides an opportunity to test the protocol as a management planning tool when planning D&D activities. Once completed, the protocol will be distributed to other DOE sites for their use is planning D&D of contaminated concrete structures.

PUBLIC ACCEPTANCE

Current DOE directive mandates interactions with stakeholders to gain acceptance for options that involve disposition in the public domain. While authorized release of concrete remains as an important option of this project, other potential options, including re-use within DOE, are also being evaluated. Incorporation of stakeholder input is an integral component for disposition options involving releasing to the public domain.

PROTOCOL DEVELOPMENT

In order for the protocol to apply across the DOE complex, it must comply with all existing Federal regulations, and be flexible enough to meet the requirements of site-specific safety documents and other requirements. The primary document that limits the release of property containing residual radioactivity is DOE Order 5400.5, "Radiation Protection of the Public and Environment". In addition, the "Draft Handbook for Controlling Reuse of Non-real Property Containing Radioactive

Material," published by DOE in 1997, provides guidance regarding the interpretation of DOE Order 5400.5. The protocol will comply with the requirements of DOE Order 5400.5, and will follow the general procedure outlined in the "Draft Handbook for Controlling Reuse of Non-real Property Containing Radioactive Material." The general procedure includes characterization of the materials, definition and development of authorized or supplemental limits, DOE Operations Office approval, documentation of approved limits in the public record, implementation and verification of approved limits, and release of the property. This procedure is general enough to apply to releases both to the public sector and within DOE. Although this project is aimed primarily at re-use of concrete material within DOE sites, the same general procedure can be applied to ensure regulatory, DOE, and stakeholder approval.

The protocol for re-use of concrete will be modeled after the Protocols for the Authorized Release of Radioactive Scrap Metals previously developed by ANL-E. As in the scrap metal protocol, the end result will basically be a decision tree management tool that can be used to determine the lowest cost and lowest risk alternative for disposing of concrete within DOE facilities. The decision tree will include a trade-off of the cost of decontaminating the concrete to various degrees compared to disposing of it, without decontamination, for various isotopes and contamination levels. It will also include numerous disposal options, such as:

- entombing the material and leaving it in place
- disposing of the concrete as low level radioactive waste (LLW)
- decontaminating the concrete to below background levels and disposing of it in a non-radioactive landfill

- re-using the concrete (as back-fill, road base, or as concrete slabs) at various levels of decontamination.

The protocol will include the ability to complete a final analysis that compares the cost of decontamination to the cost of disposal options, while providing a recommendation of the most cost effective D&D approach for an application. The cost analysis will include areas such as the cost of decontamination, demolition, surveillance, concrete crushing, and disposal, and the cost of personnel exposure during D&D activities and over the long term. In addition, factors such as public perception and acceptance will be taken into account.

Vanderbilt University's involvement will help ensure that the protocol is applicable to many sites within the DOE complex. Vanderbilt University's previous work shows the amount, type, and contamination levels of concrete within the DOE complex, so that protocol can be developed to cover the majority of concrete available for possible re-use.

INCLUSION OF EXISTING PROTOCOLS FOR RE-USE OF CONCRETE

The protocol will be in the form of a generic process that contains information necessary for the decision process and can be applied to many DOE sites. Several sites across the DOE complex have taken the initiative in developing site-specific processes for disposition of concrete. These processes have focused on their specific site applications, and will serve as useful references for this project. “Success stories” from these sites can greatly complement the complex-wide release protocol that is the objective of this project.

CONCLUSION

Facilities within the DOE system contain a large volume of clean or slightly contaminated concrete that could possibly be re-used within the DOE. This material, although not inherently valuable, holds the potential for large cost savings, if transport and disposal costs can be averted. This project is aimed at developing a protocol for determining the costs and risks associated with various options for decontamination and disposal of concrete from D&D projects within the DOE complex. Having a standard method for assessing and determining the best disposition alternative will result in standardized assessment of disposal options, possible re-use of concrete, and significant cost savings throughout the DOE complex.